

The details are shown in the following table, in which the stations are arranged according to the greatest possible duration of sunshine, and not according to the observed duration as heretofore.

Difference between instrumental and personal observations of sunshine.

Stations.	Apparatus.	Total possible duration for the whole month.	Personal estimated area of clear sky.	Instrumental record of sunshine.			
				Photographic.	Difference.	Thermometric.	Difference.
Bismarck, N. Dak.	P.	479.6	59	53	+ 4	87	+ 5
Helena, Mont.	P.	479.6	57	73	+ 6	87	+ 5
Portland, Oreg.*	P.	475.7	32	87	+ 5	87	+ 5
Eastport, Me.	P.	471.7	40	51	+11	87	+ 5
Minneapolis, Minn.	P.	471.7	40	51	+11	87	+ 5
Northfield, Vt.	P.	468.4	35	45	+10	87	+ 5
Portland, Me.	P.	468.4	37	45	+10	87	+ 5
Rochester, N. Y.	T.	465.2	58	45	+10	87	+ 5
Buffalo, N. Y.	T.	465.2	41	45	+10	87	+ 5
Boston, Mass.	T.	461.8	46	45	+10	87	+ 5
Chicago, Ill.	T.	461.8	58	45	+10	87	+ 5
Cleveland, Ohio	P.	461.8	46	59	+13	87	+ 5
Des Moines, Iowa	T.	461.8	59	44	+15	87	+ 5
Detroit, Mich.	T.	461.8	59	44	+15	87	+ 5
Dubuque, Iowa	T.	461.8	44	44	+15	87	+ 5
Eureka, Cal.	P.	458.6	39	37	- 2	87	+ 5
New York, N. Y.	P.	458.6	54	37	- 2	87	+ 5
Salt Lake City, Utah.	T.	458.6	40	71	+81	87	+ 5
Columbus, Ohio.	T.	455.2	37	63	+10	87	+ 5
Denver, Colo.	T.	455.2	53	63	+10	87	+ 5
Philadelphia, Pa.	T.	455.2	37	37	0	87	+ 5
Baltimore, Md.	T.	453.0	37	37	0	87	+ 5
Cincinnati, Ohio	T.	453.0	54	37	0	87	+ 5
Kansas City, Mo.	P.	453.0	52	61	+ 9	87	+ 5
St. Louis, Mo.	P.	453.0	56	61	+ 9	87	+ 5
Washington, D. C.	P.	453.0	40	52	+12	87	+ 5
Dodge City, Kans.	P.	450.1	55	63	+ 8	87	+ 5
Louisville, Ky.	T.	450.1	61	67	+ 6	87	+ 5
San Francisco, Cal.	T.	450.1	67	67	0	87	+ 5
Fresno, Cal.	T.	447.4	88	67	+ 21	87	+ 5
Santa Fe, N. Mex.	P.	444.3	37	55	+18	87	+ 5
Little Rock, Ark.	T.	442.0	54	47	+ 7	87	+ 5
Atlanta, Ga.	T.	439.7	47	47	0	87	+ 5
Wilmington, N. C.	T.	439.7	42	47	+ 5	87	+ 5
Phoenix, Ariz.	P.	437.2	50	73	+23	87	+ 5
San Diego, Cal.	P.	437.2	66	62	- 4	87	+ 5
Savannah, Ga.	P.	434.5	46	61	+15	87	+ 5
Vicksburg, Miss.	T.	434.5	85	61	+24	87	+ 5
New Orleans, La.	T.	429.6	65	61	+ 4	87	+ 5
Galveston, Tex.	P.	427.4	68	83	+15	87	+ 5

*Record by both methods.

ATMOSPHERIC ELECTRICITY.

Numerical statistics relative to auroras and thunderstorms are given in Table X, which shows the number of stations from which meteorological reports were received, and the number of such stations reporting thunderstorms (T) and auroras (A) in each State and on each day of the month, respectively.

Thunderstorms.—The dates on which reports of thunderstorms for the whole country were most numerous were: 3d, 224; 4th, 202; 13th, 209; 15th, 338; 22d, 205; 27th, 247.

Thunderstorm reports were most numerous in: Illinois, 239; Iowa, 201; Missouri, 275; North Carolina, 241; Ohio, 482; Pennsylvania, 202.

Thunderstorms were most frequent in: North Carolina, 31 days; Colorado, 30; Georgia and New Mexico, 29; Florida and South Carolina, 28; Kansas, Tennessee, and Texas, 27.

Auroras.—The evenings on which bright moonlight must have interfered with observations of faint auroras are assumed to be the four preceding and following the date of full moon, viz, from the 20th to the 28th, inclusive. On the remaining twenty-two days of this month 104 reports were received, or an average of about 5 per day. The date on which the number of reports especially exceeded this average was: 11th, 58.

Auroras were reported by a large proportion of observers in: Montana, 38; North Dakota, 28; Wisconsin, 17 per cent.

Auroras were reported most frequently in: Montana and North Dakota, 6 days; New Jersey, Ohio, and Wisconsin, 4 days.

CANADIAN REPORTS.

Thunderstorms were reported as follows: St. Johns, 11th; Grindstone, 15th; Halifax, 31st; Grand Manan, 13th; Yarmouth, 13th, 15th, 16th; St. Andrews, 11th, 13th; Charlottetown, 13th, 16th; Chatham, 2d, 12th; Father Point, 12th, 22d; Quebec, 12th, 17th, 22d, 27th, 30th; Montreal, 5th, 6th, 13th, 15th, 22d, 30th; Rockcliffe, 22d; Toronto, 6th, 12th, 28th, 29th; Port Stanley, 4th, 13th, 14th, 15th, 26th to 29th, 31st; Saugeen, 4th, 13th; Parry Sound, 9th, 14th, 22d; Port Arthur, 2d, 12th, 22d, 26th; Minnedosa, 4th, 14th, 15th, 17th, 19th; Qu'Appelle, 16th, 19th, 29th; Medicine Hat, 1st, 2d, 16th; Swift Current, 1st, 7th, 9th, 12th; Calgary, 24th, 28th; Prince Albert, 8th, 16th, 24th, 30th, 31st; Battleford, 8th, 10th, 16th.

Auroras were reported as follows: Sydney, 11th; Grand Manan, 11th; Charlottetown, 11th; Father Point, 11th; Quebec, 10th, 11th, 13th, 23d, 31st; Montreal, 11th; Toronto, 11th; Winnipeg, 2d, 6th; Minnedosa, 4th, 8th, 10th, 11th, 12th; Prince Albert, 3d.

INLAND NAVIGATION.

The extreme and average stages of water in the rivers for the current month are given in Table VIII, from which it appears that the Congaree, at Columbia, S. C., rose to 3.2 above danger line on the 8th, and the Willamette, at Portland, Oreg., rose to 8.5 above danger line on the 3d. In addition to these the Wabash, at Mount Carmel, Ill., was within 0.7 of the danger line from the 29th to 31st, and the Savannah at Augusta was within 2.4 of danger on the 10th. The Missouri at Kansas City was within 1.9 on the 6th.

LOCAL FLOODS.

Very many reports of high water and great damage due to local rains in small streams have come to hand; these are summarized in the following brief list arranged by dates. Most of these reports are culled from telegrams in the daily papers and are liable to occasional errors of one day.

5th.—Bellaire, Belmont County, Ohio; Ohio and Marshall counties, and Moundsville, W. Va.; Pipe Creek, Ohio, opposite Moundsville; Four Mile, near Jackson, Ohio; Frankfort, Ky.

6th.—New York, N. Y., and vicinity; Newark and Flemington, N. J.; Laurel Hill, L. I.

10th.—Iredell, Yadkin and Catawba Rivers, Scotland Neck, Tillery, and Roanoke River, N. C.

12th.—Weldon, N. C.

14th.—McArthur, Ohio; Pittsburg and Alleghany City, Pa.; Phoenix, Ash Fork, Martinez, Congress, and Kyrene, Ariz.

15th.—Pittsburg, Alleghany City, Turtle Creek, Wilmerding, Greensburg, Export, Delmont, and Crabtree, Pa.; New York, N. Y.; Grantsville, Yellow Creek, Carrollton (7.30 p.m.), Marietta, and Lima, Ohio.

18-19th.—Kansas City, Kans. (local paper called this a cloud-burst, although only three inches of rain fell in two hours); Warrensburg, Macon, Shelbyville, Blue Springs, and Hannibal, Mo.; Warsaw, Valparaiso, and Anderson, Ind.; Fairbury and Percy, Ill.; Erie, Pa.

20th.—Portsmouth, Bowling Green, Wood County, and Wauseon, Ohio; Pittsburg and Alleghany City, Pa.; Centralia, Ill., 20th, 10 p. m. to 21st, 10 a. m., very heavy rain; Evansville (8.25 a. m. of the 20th to 8 a. m. of 21st, heavy rain), and Brazil, Ind.

20th-21st.—Bensons Creek, four miles from Frankfort, Shelbyville, Lexington, Louisville, Shelby, Fayette and Woodford counties, Lawrenceburg, Ky.; Manchester, Newton, Winchester, Aberdeen, and West Union, Ohio.

21st.—Jackson, Oak Hill, Batavia, and Lima, Ohio; Des Moines, Iowa; Rockford, Ind.; Parkersburg, W. Va.

20th–22d.—Cumberland, Md.; Clarksburg, Piedmont, and Buckhannon, W. Va.; Womelsdorf, Pa.

22d.—Fort Wayne, Ind.; Findlay, Ohio (8.45 a. m. until noon).

21st–23d.—Muncie, Ind.; Springfield, Grafton, Caldwell, Zanesville, Dayton, Marietta, Portsmouth, Shawnee, London, and Newark, Ohio; Richmond, Ky.; Pittsburg, Pa.; Sisterville, Charleston, and Parkersburg, W. Va.

23d.—Ashland, Ky. (2.45 p. m. violent storm of rain passed 19 miles west of Ashland and 2 miles east of Denton).

23d–24th.—Somerset (rainfall 6 inches), Stockport (eight inches), South Charleston, Springfield (23d, 10 p. m., cloudburst), Enon, Osborne, Cold Springs, Durboin, Eagle City, Tremont City, Shattuck, Lima, Tadmire, Fremont, Findlay, Lancaster, Caldwell (23d, 11 p. m., to 24th, 8 a. m.), Zanesville, Dayton, Grove City, London, Newark, and Shawnee, all in Ohio.

24th.—Morrison and Golden, Colo., and Bear Creek and Mount Vernon canyons, near Denver. This storm apparently extended from Boulder to near Pueblo; rained hard in Pueblo all day, beginning at 4 p. m., and very severe after 7; Warsaw and Arcola, Ill.; Terre Haute, Ind. (minor tornado at 3 a. m.); flood in the Monongahela, the worst for twenty-five years; Wheeling, W. Va. (2 a. m., to 2 p. m., heavy rain for the second time within three days); Gallipolis, Ohio (20–24th, rain every day and night for five days); Shawnee, Ohio (24th a. m., very hard rain and wind, the hardest ever known); New Lexington, Ohio (23d, 11 p. m., to 24th, 7 a. m.); Harrisburg, Ohio (23d, 9 p. m., to 24th, 6 a. m.); Marietta and Zanesville, Ohio (23d–24th, heaviest rains ever known); Beverly, W. Va.

25th.—Braddock, Pa., 4.45 p. m. heavy rain began; Port Perry, Pa. (heavy rain in the valley of the Monongahela, 70 miles above this place, and great flood here).

26th.—Dubuque, Iowa, worst storm on record; a rain in the morning, another in the afternoon, and a violent storm of wind and rain in the evening; the neighboring country generally flooded, with loss of bridges and crops.

26–27th.—Delaware, Ohio, heavy rain last night; the farmers say that the excess of rain this year is more disastrous than the drought of 1895.

27th.—Port Perry, Pa. (very violent); McKeesport, Pa., 4

p. m. (heavy rain, great damage); Homestead, Pa. (heavy rain began with strong wind between 4 and 5 p. m.; raining heavily until 10 p. m.); Elkhorn, Pa. (no storm on the 25th, but very heavy between 9 p. m. and midnight July 27th; terrible rain).

27–28th.—Pittsburg and Alleghany counties, and Cecil, Washington Co.; West Newton, Buena Vista, Perryopolis, Uniontown, Westmoreland, Grove City, Beaverfalls, Brownsville, Philipsburg, Jeannette, Indiana Co., Bellefonte, Irwin, Washington, McDonnell, Mount Pleasant, all in Pennsylvania (severe wind and rain, sometimes described as a cloudburst).

28th.—Frankfort, 10 p. m., 27th to 7 a. m., 28th; Elwood, Fowler, Newcastle, and Anderson, violent rain and hail during the night (six inches of rain supposed to have fallen); Tipton, Frankton, Noblesville, Bluffton (one hail-stone weighed one pound and seven ounces); Crawfordsville, Arcadia, Muncie (frightful wind); Montpelier (hailstones 17 inches in circumference); Rushville (4.40 p. m. rain and hail); Cicero, Lebanon, Lafayette, Terre Haute, (hailstorm, 4 p. m.); Kokomo; all in Indiana.

29th.—Chillicothe, Ohio; Glouster, Athens Co., Ohio (8 p. m., destructive gales from northwest and southwest, possibly a tornado and rain); Columbus, Ohio (small tornado 29th, p. m.); Circleville, Ohio; South Charleston and Germantown, Ohio (destructive wind); Blendon, Franklin Co., Ohio (7.30 p. m., violent wind and rain); Pleasantville, Ohio (8 p. m., tornado); Mentone, Ind. (tornado, 3 p. m.); Portland, Ind. Uniondale, Ind. (destructive wind); Bluffton, Ind. (destructive wind); Geneva, Ind., destructive wind.

30th.—Salem (two storms, early a. m. and noon); Portsmouth, Ohio, and the Scioto Valley (p. m.); Steubenville, Ohio (2.15 to 2.50 p. m. cloudburst, $3\frac{1}{2}$ inches); Stockport, Ohio (violent wind and rain); Briggsdale, Ohio (most violent wind and rain); East Liverpool, Ohio (2.30 p. m., cloudburst); Alliance, Ohio (noon and 2 p. m. two heavy thunderstorms); Portsmouth, Ohio (29–30th fierce storm); 5 miles north of Delaware, Ohio (cloudburst); Jackson, Ohio (29–30th, heavy rain and wind); Harrisburg, Ohio (29–30th windstorm at night); Pickerington, Ohio (incipient tornado, at night 29–30th); Delaware, Ohio (6 p. m., small cloudburst); Glenville, W. Va.

31st.—Martins Ferry, Ohio (began 4 a. m., lasted thirty minutes).

CLIMATE AND CROP SERVICE.

By JAMES BERRY, Chief of Climate and Crop Service Division.

The following extracts relating to the general weather conditions in the several States and Territories are taken from the monthly reports of the respective services.

Snowfall and rainfall are expressed in inches.

Alabama.—The mean temperature was 80.9°, or 3.0° below normal; the highest was 105°, at Asheville on the 29th and 30th and Tuscaloosa on the 31st, and the lowest, 50°, at Madison on the 9th. The average precipitation was 5.06, or 0.66 above normal; the greatest monthly amount, 12.57, occurred at Newton, and the least, 105, at Uniontown.

Arizona.—The mean temperature was 83.3°, or 3.3° above normal; the highest was 120°, at Texas Hill and Fort Mohave on the 14th, and the lowest, 45°, at Flagstaff on the 27th and 29th. The average precipitation was 3.10, or 1.90 above normal; the greatest monthly amount, 6.92, occurred at Walnut Ranch, and the least, "trace," at Parker.

Arkansas.—The mean temperature was 83.5°, or 3.3° above normal, the highest July mean during the past fourteen years; the highest was 110° at Malvern, on the 31st, and the lowest 52°, at Silver Springs on the 9th. The average precipitation was 1.61, or 2.30 below normal; the greatest monthly amount, 7.50, occurred at Corning; Elon reported no rain. The drought that prevailed over all but a small area in the north-east part of the State, together with the very high temperature and hot

drying winds, did irreparable injury to all growing crops. Cotton, which at the beginning of the month never showed a better prospect for a very large yield, had, through shedding and premature opening of bolls, so deteriorated that at the end of the month there was but a very poor crop in sight. Corn was seriously injured and almost a total failure in many localities. The hay crop is short, pastures drying up, and stock water very scarce. The "oldest inhabitants" report the drought the most severe since 1874.

California.—The mean temperature was 76.6°, or 3.5° above normal; the highest was 124°, at Volcano Springs on the 12th, and the lowest, 27°, at Quincy on the 28th. The average precipitation was 0.09, or 0.04 above normal; the greatest monthly amount, 2.57, occurred at Isabella; numerous places reported no rainfall.

Colorado.—The mean temperature was slightly above normal; the highest was 104°, at Minneapolis on the 22d, and Lamar on the 29th, and the lowest, 28°, at Gunnison on the 21st. The average precipitation was 2.32, or 0.05 below normal; the greatest monthly amount, 5.00, occurred at Lake Moraine, and the least, 0.07, at Vilas.

Florida.—The mean temperature was 81.4°, or 1.2° below normal; the highest was 103°, at McClenny on the 30th, and the lowest, 57°, at Tallahassee on the 7th. The average precipitation was 8.18, or 1.36 above normal. The greatest monthly amount, 19.97, occurred at Milton, and the least, 2.43, at Merritts Island. The hurricane that swept the western portion of the State on the 7th was one of the severest in the his-